

It is indisputable, therefore, that Mr. Jeffreys had studied my writings, and that the opinion entertained of them by him in 1866 was revoked in favour of that expressed by him in 1868; whilst that expressed in 1868 has again in its turn been superseded by the very positive contradiction it receives in his note in 'Nature' published a fortnight ago!

It is likewise deserving of special notice that Dr. Carpenter, who might be supposed to have made himself acquainted with the whole past literature of the subject, should, at p. 181 of the official copy of his 'Preliminary Report on Dredging for 1868,' have thought it expedient to single out from these two most conflicting statements that which was offered by Mr. Jeffreys in 1868 (see above), as evidence that "*Dr. Wallich's just claims had not by any means commanded the universal assent of naturalists*"—an assent to which, if just, as it has now been most clearly proved that they were and are, those conclusions were long ago entitled.

With regard to Mr. Jeffreys's division of oceanic animals into "zoophagous" and "sarcophagous," I have nothing to urge beyond my avowed inability to discern any valid physiological difference between those that are zoophagous and those that are sarcophagous. It rests with Mr. Jeffreys to explain on what grounds he has felt justified in declaring so emphatically that "*none*" of the animals "*of all kinds and sizes, everywhere abundant from the surface to the bottom,*" observed by him in his exploration of the North Atlantic, were phytophagous.

It only remains for me to add that for years I stood alone in maintaining, in opposition to the opinion of Ehrenberg and his followers, that all plant-life becomes extinct at depths exceeding 400 or 500 fathoms, and that the nutrition of the Foraminifera and some other orders of oceanic Rhizopods is effected by a special vital function, whereby they are enabled to eliminate, from the medium in which they live, the elementary ingredients which enter into the formation of their body- and shell-substances. The facts and reasoning on which my observations were based will be found in the various published papers &c. already referred to.

I remain, Gentlemen,

Yours very faithfully,

G. C. WALLICH.

Kensington,  
December 24, 1869.

*On the Specific Distinctness of Anodonta anatina.*

*To the Editors of the Annals and Magazine of Natural History.*

GENTLEMEN,—There has been, and, I believe, still is, a diversity of opinion as to whether *Anodonta anatina* is a distinct species or only a variety of *Anodonta cygnea*. I have, since I commenced the study of conchology, inclined to the former view; and I think I am now able to bring forward evidence in favour of it which has not been

adduced before. It has been maintained that these animals are varieties because no difference is to be found in their soft parts, excepting as regards the general shape, which corresponds to that of the shell. But I have observed, in *Anodonta anatina*, that the branchial opening is not only comparatively, but actually, much larger and fringed with much more delicate and numerous tentacles than in *Anodonta cygnea*.

There also seem to be conflicting ideas as to the direction in which the respiratory current proceeds, some contending that it invariably enters through the branchial orifice, and makes its exit through the anal one, others that it may proceed either in this or the reverse direction. I have taken some pains in investigating this subject, and have repeatedly tried experiments with the animals to find out the facts of the case; and the conclusion I have arrived at is, that, under ordinary circumstances, the current enters through the branchial opening, and issues through the anal one only. It may, however, in addition, enter at the anterior end or any intermediate point; but it never issues from any place other than the anal opening, excepting under peculiar circumstances, which I will presently mention, and then it is spasmodically. The ordinary position in which the animal is found is with the posterior end projecting from the mud which forms the sides and bottom of its habitat, the rest being imbedded in it. In this case, the direction of the current is the normal one; but should the animal choose to repose wholly uncovered by the mud, as not unfrequently happens, it then will separate the edges of the mantle from one another at some point, and through this the water flows also into it. Should, however, the branchial orifice from any cause become covered by sand or mud and the anal one remain free, it will then draw water in through the anal opening and expel it through the branchial one, causing the sand or mud to be blown away with very great violence, after which the normal state of affairs is resumed. This action is purely mechanical, the animal relaxing the adductor muscles, the valves gape, the opening, however, which would otherwise have been formed remaining closed by the thickened edges of the mantle being kept in contact; this causes the water to enter the anal orifice; then the valves are suddenly closed, and the water ejected through the branchial opening, the whole action being, in fact, exactly that of a pair of bellows. If both orifices are covered and there is water between the valves, they are brought together, and the branchial one freed, the anal one afterwards being uncovered by the ordinary action of the current. Any other point on the free margin of the shell may be uncovered in a similar manner. These facts I have tested by many trials, both with the Anodons and the Unios.

I remain, yours truly,  
R. M. LLOYD.

8 Weston Road, Handsworth, Birmingham,  
Dec. 9th, 1869.